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A Sensor Interface For Human Health Monitoring In IOT

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Abstract— **Wireless Sensor(WSN)has been employed to collect data about physical phenomenon in various application such as health monitoring and industrial monitoring. Internet of Things(IoT) has attracted a lot of attention and is expected to bring benefits to numerous application areas including industrial WSN systems and health care systems. Internet of things(IOT) refers to the interconnection of uniquely identifiable embedded computing like services within the existing internet infrastructure. Each sensor connected to the device is required to write complicated and cumbersome data collection code. To solve these problems an method is proposed to design a reconfigurable smart sensor interface for industrial WSN in IoT environment. Thus, it can read data in parallel and in real time with high speed on multiple different sensor data. The performance of the proposed system is verified and good effects are achieved in practical application of IoT. By detecting the values of sensors it can easily find out the Temperature, Gas present in the industrial environment. So that critical situation can be avoided and preventive measures are successfully implemented.**

Index Terms— **Wide Area Networking(WSN), Internet of Things(IOT), sensor data acquisition.**

I. INTRODUCTION

Wireless Sensor Networks(WSN) has been employed to collect data about physical phenomena in various applications such as health monitoring, and industrial monitoring Sensor interface device is essential for detecting various kinds of sensor data of industrial WSN in IoT environments[7]. It enables us to acquire sensor data. Thus, we can better understand the outside environment information. However, in order to meet the requirements of long-term industrial environmental data acquisition in the IoT, the acquisition interface device can collect multiple sensor data at the same time, so that more accurate and diverse data information can be collected from industrial WSN. With rapid development of IoT, major manufacturers are dedicated to the research of Multisensor acquisition interface equipment[8]. There is a lot of data acquisition multiple interface equipments with mature technologies on the market. But these interface devices are very specialized in working style, so they are not individually adaptable to the changing IOT environment[9]. Meanwhile, these universal data acquisition interfaces are often restricted in physical properties of sensors (the connect number, sampling rate, and signal types). Now, micro control unit(MCU) is used as the core controller in main stream data acquisition interface device. MCU has the advantage of low price and low power consumption, which makes it relatively easy to implement. But, it performs at ask by way of interrupt, which makes these multisensor acquisition interfaces not really parallel in collecting multisensor data. FPGA has unique hardware logic control, real-time performance and synchronicity, which enable it to achieve parallel acquisition of multi-sensor data and greatly improve real-time performance of the system. FPGA has currently becomes more popular than MCU in multi-sensor data acquisition in IoT environment. However, in IoT environment, different industrial WSNs involve a lot of complex and diverse sensors. At the same time, each sensor has its own requirements for read out and different users have their own applications that require different types of sensors[5]. It leads to the necessity of writing complex and cumbersome sensor driver code and data collection procedures for every sensor newly connected to interface device, which brings many challenges to the researches. Sensor data acquisition surface device is the key part of study on industrial WSN application. In order to standardize a wide range of intelligent sensor interfaces in the market and solve the compatibility problem of intelligent sensor, the IEEE Electronic Engineering Association has also launched IEEE1451 smart transducer(STIM) interface standard protocol suite for the future development of sensors. The protocol stipulates a series of specifications from sensor interface definition to the data acquisition[6]. The STIM interface standard IEEE1451 enables sensors to automatically search network, and the STIM promotes the improvement of industrial WSN[6]. These interface devices are usually based on relatively complex dedicated electronic boards. It is obvious that such restriction should be released, and are configurable multi-sensor data acquisition interface with good compatibility and normative interface standard needs to be developed in IoT environment. By focusing on the above issue, this paper designs and realizes a smart sensor interface for industrial WSN in IoT environment. This design presents many advantages as described below. First of all, FPGA is used as the core controller to release the restriction on the universal data acquisition interface, and realize truly parallel acquisition of sensor data. It has not only improved then sensor data collection efficiency of industrial WSN, but also extended the application range of the data acquisition interface equipment in IoT environment. Secondly, an new design method is proposed in this paper for multi-sensor data acquisition interface that can realize plug and play for various kinds of sensors in IoT environment.

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II. RELATION WITH IOT

With the advancements in Internet technologies and WSNs, a new trend is forming in the era of ubiquity. "IoT" is all about physical items talking to each other, where machine-to-machine (M2M) communications and person-to-computer communications will be extended to "things". Key technologies that drive the future of IoT are related to smart sensor technologies including WSN nano technology, and miniaturization. IoT is a major drive to support service composition with various applications. The architecture of IoT is illustrated as in Fig.2.1.

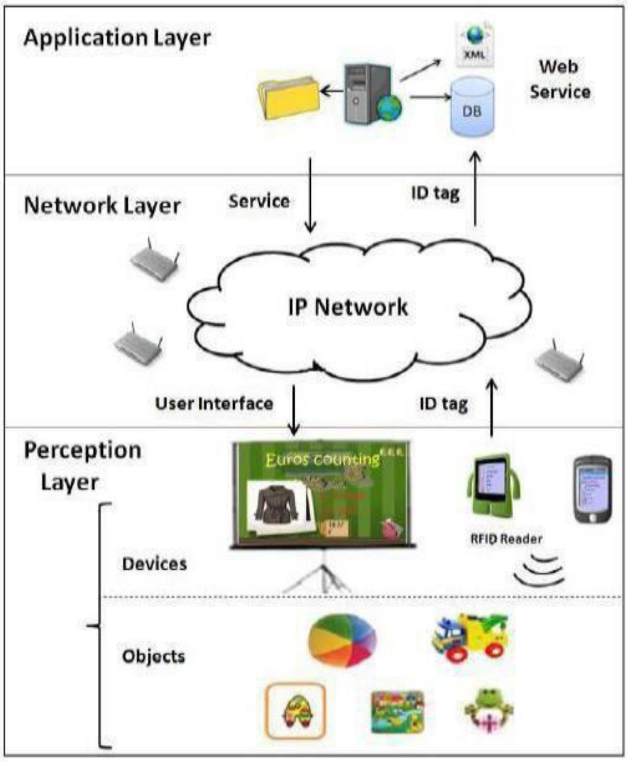


Fig 2.1. Architecture

It consists of three layers: 1)perception layer; 2)network layer; and 3)application layer. The design of data acquisition interface is mainly applied to the perception layer of IoT. We design and implement a WSN data acquisition interface that can be used for environmental monitoring.

1. *Microcontroller:*

The Spartan-3 (XC3S200) is a mini-module composed of a FPGA device and a configuration memory with a PAL/GAL compatible 24 pin DIL footprint. The overall structure of smart sensor interface consists of FPGA Spartan-3 (XC3S200chip), crystal sand peripheral circuit, communication circuit for turning USB to serial port (PL2303 HXC chips and peripheral circuits), power supply of 1.8 and 3.3V (LM1117 chip, voltage regulator and filter circuit), an SRAM memory (TC55V400 chip), high -speed8 –channel ADC (ADS7870 chip and peripheral circuit), LED indicator light, an analog extended interface, and three digital extended interfaces. Every extended interface among them can connect eight independent sensors, namely, there configurable smart sensor interface device can access eight analog signals and 24 digital signals.

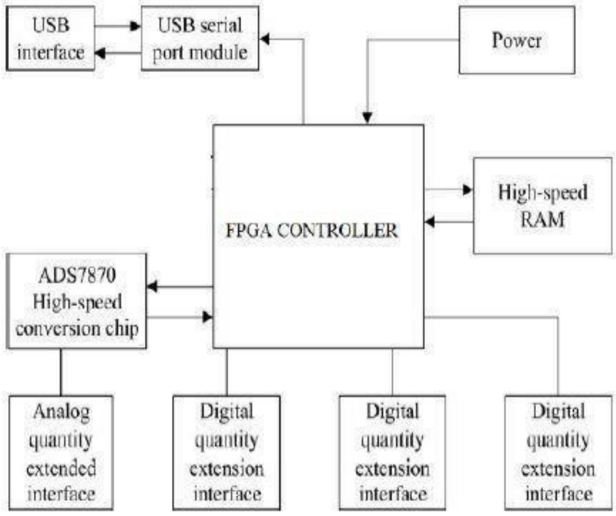


Fig2.2. FPGA HARDWARE BLOCK DIAGRAM

Fig2.2.shows the FPGA hardware block diagram. The hardware system can also send and receive data besides the basic sensor data acquisition. It can send data to the control center via USB serial port module. Data communication function can also control the running status of corresponding peripheral device.

2. *SENSOR*

A sensor is a device used for the detection of changes in quantities and it provides a corresponding output, generally as an electricaloroptical signal. A sensor's sensitivity indicates how much the sensor's output changes when the input quantity being measured changes. Making the sensor smaller often improves its performance of measuring and it can be designed to have a small effect and also introduces many advantages. Various sensors used here are for measuring temperature, gas, heart beat sensor.

III. ARCHITECTURE

The overall structure of reconfigurable smart sensor interface Consists as below and shown the block diagram in fig3.1

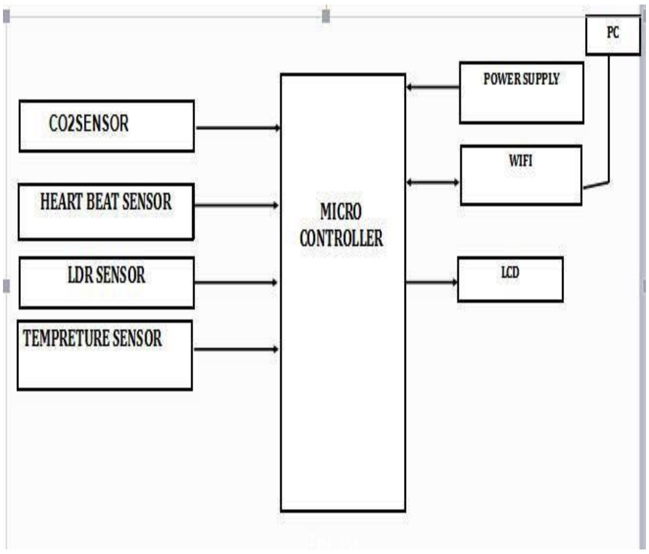


Fig3.1Blockdiagram

A.ARM7Microcontroller

The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7 TDMI-SCPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32Kb to 512kB. A128-bit wise memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

FEATURES

- 16-bit/32-bitARM7TDMI-SmicrocontrollerinatinyLQFP 64package.
- 8kBto40kBofon-chipstaticRAMand32kBto512kBofonchip flash memory.
- 128-bitwideinterface/acceleratorenableshigh-Speed60MHzoperation.

B .TEMPRETURE SENSOR

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in °Kelvin, as the user is not required to subtract a large constant.

Voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4° C at room temperature and ±3⁄° Cover a full −5 to +150° C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to read out or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. A sit draws only 60μA from its supply, it has very low self-heating, less than0.1°C in still air. The LM35 is rated to operate over a −55° to +150°C temperature range.

FEATURES

- Calibrated Directly in Celsius(Centigrade)
- Linear+10-mV/⁻ C Scale Factor
- 0.5 ⁻ C Ensured Accuracy(at 25 ⁻ C)
- Rated for Full −55°C to 150°CRange
- Suitable for Remote Applications
- Operates from 4Vto30V

C.GASSENSOR

This sensor is used to sense the leakage of LPG. In normal conditions the output of this sensor is 'high' and it goes 'low', when the LPG is sensed. We are using MQ2 sensor in our project.

FEATURES

- High sensitivity to LPG, ISO-butane, propane
- Small sensitivity to alcohol, smoke.
- Fast response
- Stable and long life
- Simple drive circuit

D.HEARTBEATSENSOR

The new version uses the **TCRT1000** reflective optical sensor for photoplethysmography. This project is based on the principle of photoplethysmography (PPG) which is a non-invasive method of measuring the variation in blood volume in tissues using a light source and a detector. Since the change in blood volume is synchronous to the heart beat, this technique can be used to calculate the heart rate. Transmittance and reflectance are two basic types of photoplethysmography. For the transmittance PPG, a light source is emitted in to the tissue and a light detector is placed in the opposite side of the tissue to measure the resultant light. Because of the limited penetration depth of the light through organ tissue, the transmittance PPG is applicable to a restricted body part, such as the finger or the earlobe. However, in the reflectance PPG, the light source and the light detector are both placed on the same side of a body part. The light is emitted in to the tissue and the reflected light is measured by the detector. As the light doesn't have to penetrate the body, the reflectance PPG can be applied to any parts of human body. In either case, the detected light reflected from or transmitted through the body part will fluctuate according to the pulsate blood flow caused by the beating of the heart.

E. LCD

To display any character on LCD microcontroller has to send its ASCII value to the data bus of LCD.

<u>LCD Initialization</u>

1. Display On-Off control: Send 0FH for display and blink cursor on.
2. Specify function set: Send 38H for 8-bit, double line and 5x7 dot character format.
3. Entry mode set: Send 06H for cursor in increment position and shift is invisible.
4. Clear Display: Send 01H to clear display and return cursor to home position.

F.LDR

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1,000,000 ohms, but when they are illuminated with light, the resistance drops dramatically. Thus in this project, LDR plays an important role in switching on the lights based on the intensity of light i.e., if the intensity of light is more (during day time) the lights will be in off condition. And if the intensity of light is less (during nights), the lights will be switched on.

G.WIFI

Serving as a Wi-Fi adapter, wireless internet access can be added to any microcontroller based design with simple connectivity through UART interface or the CPU AHB bridge interface.

FEATURES

- Supports antenna diversity
- Power down leakage current of<10uA

- Wakeup and transmit packets in < 2ms. Standby power consumption of < 1.0mW (DTIM3)

H.POWERSUPPLY

The circuit needs two different voltages, +5V & +12V, to work. These dual voltages are supplied by this specially designed power supply. The power supply, unsung hero of every electronic circuit, plays very important role in smooth running of the connected circuit. The main object of this 'power supply' is, as the name itself implies, to deliver the required amount of stabilized and pure power to the circuit.

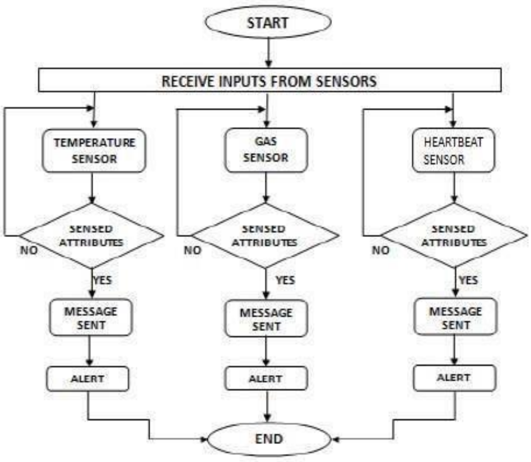
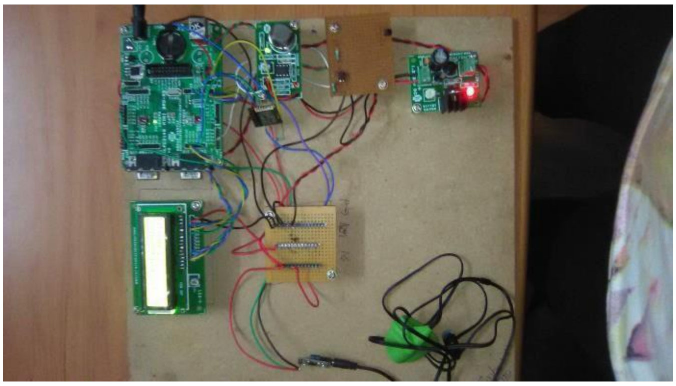
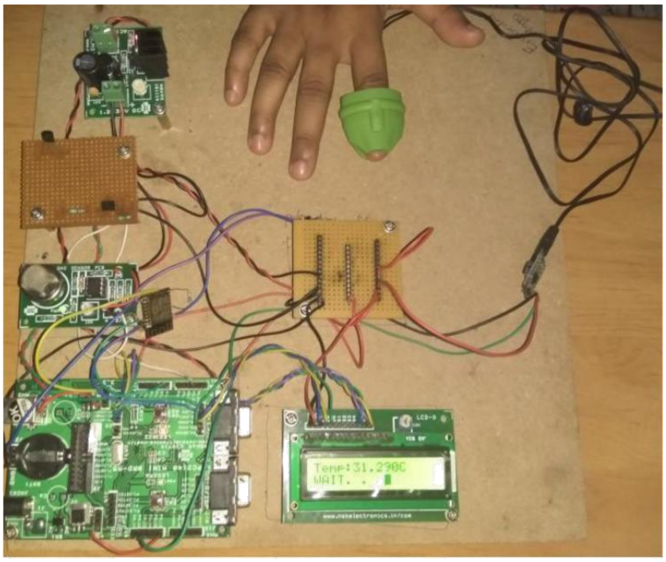


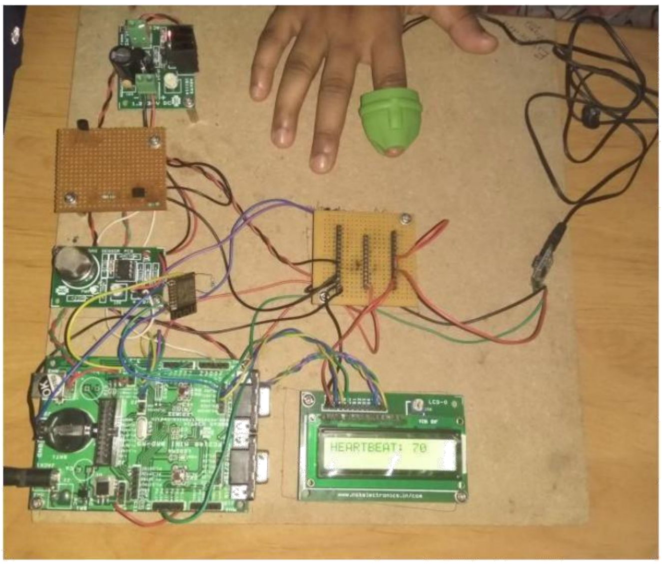
Fig 3.2. Flow of the project

IV. RESULTANALYSIS

Results obtained by our project are shown below.







V. CONCLUSION

Our project is implemented successfully for which it is designed like detecting the CO2 gases and other combustible gases and shows the accurate room temperature and also the human temperature and it shows the pulse rate of the person and sends the data/message to the authorized person. On observation of the performance it is applied to many applications. In the near future internet and wireless technologies will connect different sources of information. The number of devices which connect to the Internet exponentially increasing. These billions of components consume and process information in different environments such as hospitals, factories and airports as well as in the work and everyday lives of people.

REFERENCES

[1].Qingping Chi, Hairong Yan, Chuan Zhang, Zhibo Pang, and LiDaXu, ― A Reconfigurable Smart Sensor Interface for Industrial WSN in IoT Environment, IEEE Transactions on Industrial Informatics, Vol.10, NO.2, MAY2014, pp.14171425.

[2]Shifeng Fang, LidaXu; HuanPei; Yong qiang Liu; Zhihui Liu; Yunqiang Zhu; Jianwu Yan; and Huifang Zhang, ― An Integrated Approach to Snow melt Flood Forecasting in Water Resource Management, Industrial Informatics, IEEE Transactions, Volume:10, Issue:1,Apri l2013,pp.548 – 558.

[3]Cheong,P., Ka-Fai Chang, Ying-HoiLai, Sut-KamHo, Iam-KeongSou, and Kam-Weng Tam, ― A ZigBee –Based Wireless Sensor Network Node for Ultra violet Detection of Flame,Industrial Electronics, IEEE Transactions, Volume 58, Issue:11, February 2011, pp.5271 – 5277.

[4]Dr.V.Bhuvaneswari, Dr. RPorkodi, ― The Internet of Things(IoT) Applications and Communication Enabling Technology Standards: An Overview, International Conference on Intelligent Computing Applications, 2014, pp.324 -329.

[5]R.Karpaga Priya, T.Karpoora Eswari, and K.Akilakumari, ― Industrial WSN in IOT Environment Interface with Smart Sensor Using ARM, International Journal of Advance Research in Science And Engineering (IJARSE), Vol.No.4, Special Issue(02), February 2015, pp.204 -215.

[6]Z.Pangetal., "Eco system analysis in the design of open platform based in-home health care terminals towards the internet-of-things," in Proc. IEEE 15th Int. Conf. Adv. Commun. Technol.(ICACT), 2013, pp.529–534.

[7]L.Xu,"Introduction:Systemsscienceinindustrialsectors,"Syst.Res.Behav. Sci.,vol.30,no.3,pp.211–213,2013.

[8]L. Benini, "Designing next-generation smart sensor hubs for the Internet of-Things, "in Proc. 5th IEEE Int. Workshop Adv. Sensors Interfaces(IWASI),2013,p.113.

[9]Y.Chenand V.Dinavahi, "Multi-FPGA digital hardware design for detailed large-scale real-time electromagnetic transient simulation of power systems, " IET Gener. Transmiss. Distrib., vol.7, no.5, pp.451–463,2013